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SYNOPSIS OF SURVEY FINDINGS

High Tech Manufacturers

White Paper

Prepared
for
Survey Participants

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A

Background

The following paper was prepared utilizing the survey data gathered for a custom research study performed for a major Silicon Valley chip manufacturer. The objectives of the field research were to gain an understanding of how other firms in the industry were deploying and managing information technology and related services to meet their business and operational systems requirements. *(The use of information technology for R&D and engineering was not a focus of this study.)*

Telephone interviews were conducted with IS executives from eight large corporations utilizing the an interview guide specifically designed by INPUT for the survey. Participants included the following firms:

. Advanced Micro Devices
. Applied Materials Corp.
. Hewlett-Packard
. Intel Corp.
. National Semiconductor
. Sun Microsystems
. Tandem Computers
· Raytheon Corporation

All interviewees were notified of the purpose of the study. Specific results which might identify interview respondents were not disclosed to INPUT's client.

A variety of specific topics were explored with each firm, including systems architecture, technology deployment, the use of outside products and services, culture and organization, and systems priorities. The remainder of this paper summarizes the survey findings according to the aforementioned subject areas.

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B

Systems Architecture

1. Computing Environment - Business and Operational Systems

Of the firms sampled, most use a combination of mainframe, midrange, and PC or workstation platforms, with applications distributed as follows:

. *Mainframe* - High-volume or centralized functions such as financials, order processing, etc.

. *Midrange* - Shop floor manufacturing, regional, or end-user functions

. *PCs/Workstations* - Primarily office automation functions, with most sites moving in the direction of client/server business applications

The interview data gives a general picture of the business systems architectural environment. *Exhibit 1* summarizes the interview results with regard to platforms and applications. Each characteristic is followed by the number of sites to which it applies. (Since respondents were permitted to respond to more than one answer in each category, the totals may be less than or exceed the total sample of 8.)

EXHIBIT 1

Survey Results - Platforms and Applications

Architectural Characteristic	Number Mentions
Major Platform	
Mostly Mainframe	2
Mix of Mainframe and Midrange	4
Mostly Midrange	1
PC/Workstations Applications	
Office Systems (PCs/DOS/WINDOWS)	8
Office Systems (UNIX)	3
Client Server/Under Study or Pilot Test	5
Client Server/In Production	1

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The primary vendors represented in the sample come as no surprise. The following provides a synopsis of the interview data on key vendors.

- All eight of the companies in the sample utilize IBM or IBM-compatible mainframes for their large-scale business applications.

- Two rely primarily on networked minis to provide distributed business applications in conjunction with their mainframe environments. These were either DEC or HP environments. One firm indicated that it was using AS/400s for this class of application.

- Shop floor business systems were dominated by HP and DEC as well.

In essence, all the interview data supports the conclusion that, in general, heterogeneous architecture is typical of the firms in the industry.

2. Computing Environment - R&D and Engineering Systems

Although not the primary focus of the study, the survey of competitors did explore the platform environments used for R&D and engineering. Most of the IS executives interviewed were responsible for business and operational systems, and therefore had less knowledge of these systems. Nevertheless, they were able to characterize the platforms and vendors used in their companies' R&D and engineering applications environment. A synopsis of their comments follows.

- Virtually all the companies in the sample relied primarily on high-powered workstations as the platform for R&D and engineering. Mainframes are deployed mainly in client/server or heavily compute-bound applications.

- Although most firms utilize a mixture of vendors to provide workstations, the dominant supplier was Sun (six of the eight). Apollo/HP dominated the remaining two; and one firm reported that it was currently working with MIPS as a platform for this class of applications.

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C

New Technology Deployment

Part of the survey of was designed to determine to what degree each firm was either examining or implementing key information systems technologies. Each interviewee rated each of the technologies listed in *Exhibit 2* on the degree to which their firm is examining or already deploying the technology. Average ratings are shown on a scale of 1 - 5 with 5 being the highest degree of investment or exploratory interest.

EXHIBIT 2

Investment/Interest in New Technologies
(Scale of 1 - 5, 5 Highest)

Technology	Average Rating
RDBMS (Relational Data Base Mgt. Systems)	4.1
LAN (Local-Area Network-Based Applications)	4.0
CASE (Computer Automated Systems Engineering)	3.4
Client/Server Architectures	3.0

Some observations that came out of the discussions on new technologies follow:

- CASE is used to some degree at most sites. As is the situation with most of the industry, the degree of success with the use of CASE varies significantly; and most firms have not been able to prove the benefits in terms of real dollar savings.

- Relational data bases are used extensively, although most sites have a large number of older systems that are not relational. Consideration is being given to either re-architecting these systems or rewriting them utilizing relational data base concepts.

- There is a high level of interest in client/server architectures, although most sites are in the research stage with this technology.

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D

Use of Outside Services

1. Outsourcing

- None of the organizations interviewed are currently outsourcing all or part of their IS function.

- One firm is actively looking to outsource "non-core" competencies such as data center operations and/or systems administration.

- Another firm in the sample recently solicited bids from two large information services firms and found the costs too high.

- One firm recently established an "internal" outsourcing organization to run its data centers.

Clearly, outsourcing is being given consideration to one degree or another by a significant portion of the firms interviewed in this study.

2. Utilization of Applications Software Packages

All firms interviewed for this study look to outside applications software packages to provide functionality wherever possible. *Exhibit 3* lists the classes of major applications software packages ranked by the number of firms in the sample that purchased an outside package to meet their needs.

EXHIBIT 3

Frequency of Outside Software Purchases

Application Class	Number Mentions
Financial or Human Resources	7
Shop Floor Control	6
Manufacturing Control	5
Distribution	1

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A significant outcome of this survey is that in total, six of the eight firms surveyed (all semiconductor firms) use Consilium's shop floor control system.

E

Quality Assessment/Systems Priorities

The last two sections of the survey were designed to establish the sample's level of satisfaction with various aspects of the information systems function and to determine key systems priorities.

1. Quality Assessment

Exhibit 4 presents the average ratings (on a scale of 1 to 5, with 5 being the highest) of respondents' assessments of the quality of various aspects of their systems.

EXHIBIT 4

Ratings of Respondents' Systems Functions
(Scale of 1 - 5; 5 Highest)

Systems Activity	Rating
Computer Operations/Systems Maintenance	3.9
Engineering Systems	3.8
Communications with IS	3.4
Long-Range Systems Planning	3.3
Business Systems	3.2

Some observations on the interview data follow.

- Survey respondents perceive that their engineering systems are generally of higher quality than their business or operational systems.

- Operational integrity of the business systems processing network was highly rated by participants in the survey.

- Business systems were perceived as acceptable or average in quality by those participating in the survey.

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2. Top IS Priorities of Competitors

Respondents were asked to identify their top IS priorities for the next three years as part of the survey. A total of 29 priorities was identified in this process. *Exhibit 5* groups these twenty-nine systems priorities into five categories ranked by frequency of mention. A brief explanation of each category follows the exhibit.

EXHIBIT 5

Top Systems Priorities

Systems Priorities	Number Mentions
Downsizing or Distributing Applications	11
Improving User Access to Information	6
Re-Engineering Application/Network Architecture	5
Making Greater Utilization of Outside Resources	4
Moving in the Direction of CASE Technology	3

- *Downsizing or Distributing Applications* was expressed as a systems priority in a variety of ways. In essence, most of the firms are looking at how client/server architectures coupled with open systems standards can be deployed to reduce costs and provide greater flexibility in terms of operational systems.

- *Improving User Access to Information* was collectively the number-two priority of survey respondents. The survey suggests a universal movement to GUI (graphical user interfaces), relational data base management systems, and the provision of end-user tools along with training and support to make end users self-sufficient in terms of their management information needs.

- *Re-Engineering of Applications or Network Architecture* was a common concern of the firms interviewed. Particular emphasis is being placed on shop floor and marketing related systems.

- *Making Greater Utilization of Outside Resources* was also a common theme of the survey respondents. Three areas were emphasized.

  - Utilization of off-the-shelf applications software

  - Outsourcing of non-critical professional services under long-term professional services contracts

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- Evaluation of outsourcing options for data processing operations

All the firms interviewed use outside services and software to some degree. The trend appears to be to more aggressively pursue options available on the outside.

- *Moving in the Direction of CASE Technology* was mentioned explicitly as a priority systems initiative by three of the firms in the sample. To some degree all of the respondents are involved in at least studying CASE at the moment.

F

Corporate Culture and Organization

The firms interviewed are in the middle of the spectrum between centralization and decentralization with regard to management of general business operations. Three organizations were very decentralized, two were very centralized. Companies whose primary mission is the design and production of chip technology tended to be in the middle group.

All the firms interviewed had a strong engineering orientation. All but one indicated that the style was entrepreneurial.

Participants were asked to rate the degree of centralization of various aspects of their systems function on a scale of 1 - 5, with 1 being highly decentralized and 5 being highly centralized. Average ratings for various aspects of the systems function are shown in *Exhibit 6*.

EXHIBIT 6

Degree of Centralization
Respondents' Systems Management Activities

Systems Activity	Rating
Long-Range Architectural Planning (Hardware/Software/Networks)	4.5
Long-Range Applications Planning (Applications)	3.9
Operations (Data Centers/Networks)	3.4
Applications Development	3.1

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The results suggest that most firms in the sample have strongly centralized planning for information systems. Likewise, the operations function tends to be more centralized than decentralized. Applications development is handled on a centralized basis for core systems impacting multiple operating divisions, and on a decentralized basis for departmental or divisional systems. Centralized control of the platform environments, standards and operational integrity insures that decentralized development activities will mesh with corporate systems in a consistent way.

G

Systems Expenditures

As part of the survey process, respondents were asked to estimate their systems budgets for operational and engineering-related systems activities. Of the eight firms in the sample, only three agreed to respond. With such a small sample, it is not possible to draw any statistically verifiable conclusions. However, there are a number of observations that can be made based on the data supplied. *(NOTE: The data used to make the following observations does not include hardware maintenance and data communications.)*

1. Operational Systems Expenditures

- The three responding companies spend approximately 2.8% of annual revenues on operational or business systems.
- The average percent of that budget spent on outside services and software is 18%.

2. R&D/Engineering Expenditures

- Expenditures on engineering and R&D-related systems averaged about 150% of expenditures on operational systems.
- Variation was between 100% and 200%

H

Wrap-up

In general the quality of the survey results was excellent. INPUT expresses its appreciation to those firms who participated in this survey.

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